REMARKS

By the foregoing amendment, Claims 12 and 14 have been cancelled, because they are directed to a non-elected invention. Accordingly, Claims 1-11 and 13 remain pending in this application, together with new Claims 15 through 18 which are added above.

The drawings have been objected to under 37 C.F.R. §1.83(a) on the grounds that they fail to illustrate the evaporation unit 2 entirely surrounded by the chambers as recited in Claim 2, and the fuel cell system recited in Claim 13. In response to this ground of objection, Applicants have submitted herewith a corrected drawing sheet, which includes the fuel cell system in Figure 1. In addition, the specification has been amended at paragraph [0037] by adding a sentence referring to the fuel cell system 13 as now shown in Figure 1. Support for this addition to paragraph [0037] is found in the last sentence of paragraph [0025].

With regard to the evaporation unit being entirely surrounded by the chambers as recited in Claim 2, Applicants refer to paragraph 44 of the specification, describing Figure 2, which is a cross-sectional depiction showing the evaporation unit 2 surrounded by the chambers 20, 21. In particular, paragraph [0044] states that the evaporation unit 2 "is provided in the interior of the stacked arrangement of chambers 20, 21 and catalyst discs 30". and

Amendments to the Drawings:

The attached sheet of drawings includes changes to Fig. 1. (This sheet includes Fig. 2.)

Attachment: Replacement Sheet

moreover that, "The evaporation unit 2 is surrounded by the chambers 20, 21." In order to further clarify this point, Applicants have amended paragraph [0034] of the specification, which also refers to the evaporation unit 2 as being "completely surrounded by the chambers", by adding an express reference to Figure 2. Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

The drawings have been further objected to on the ground that Figure 3 is not described in the Detailed Description of the Invention. In addition, the Office Action also states that it is unclear how Figure 3 differs from Figure 2, and queries the significance of the vertical lines in Figure 3. In response to this ground of objection, Applicants refer to the specification at paragraph [0020], which discusses the embodiment of Figure 3, and explains that the evaporation unit in that embodiment comprises a plurality of channels as shown in Figure 3. In order to facilitate a better understanding of the invention, however, Applicants have abbreviated paragraph [0020], and have inserted the entirety of former paragraph [0020] as new paragraph [0046.1] in the Detailed Description of the Invention. Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

Finally, the specification has been further objected to as failing to provide a proper antecedent basis for the recitation in Claim 2 that the evaporation unit is entirely surrounded by the chambers. This ground of objection has been

addressed previously, and Applicants respectfully submit that this embodiment is shown in Figure 2, and is described in the specification at the portions referred to previously.

Claim 8 has been rejected under 35 U.S.C. §112, second paragraph for failing to particularly point out and distinctly claim the invention. In particular, the Office Action at paragraph 6 queries how the thermal coupling is designed to be variable in an adversely proportional manner to the temperature gradient. Applicants respectfully traverse this ground of rejection. It is noted in this regard that there are numerous ways in which such an inverse relationship between the thermal coupling and the temperature gradient could be accomplished, all of which are well known to those skilled in the art. Accordingly, Applicants believe that the disclosure is sufficient to enable a person skilled in the art to make and use the invention of Claim 8.

Claims 1-11 and 13 have been rejected under 35 U.S.C. §102(b) as anticipated by Schuessler et al (EP 0 878 442), which is the EPO equivalent to U.S. Patent No. 6,428,758. (For the purpose of the following discussion, Applicants have referred herein to the U.S. patent.) In addition, Claims 1, 3, 5, 9-11 and 13 have been rejected as anticipated by Isomura et al (U.S. Patent No. 5,741,474). Finally, Claims 1-11 and 13 have been further rejected as anticipated by Lamla et al (Japanese patent document JP 2000-237582). However, for the reasons set forth hereinafter, Applicants respectfully submit

that all of Claims 1-11, 13 and 15-18 distinguish over the cited references, whether considered separately or in combination.

The present invention is directed to a device for evaporating a liquid for a reactor having a plurality of chambers for carrying out a solid-catalyzed reaction, and a common evaporation unit for evaporating liquid starting materials. For the latter purpose a common evaporating unit is provided in thermal contact with the plurality of reaction chambers which constitute a catalytic reactor. According to a feature of the invention, as recited in Claim 1, the portion of the evaporation unit in which evaporation of the liquid starting materials substantially takes place is "at least partially surrounded by the plurality of chambers" which collectively form the reaction chamber.

The Schuessler et al reference discloses a reforming reactor that includes an evaporator body "that adjoins the reaction zone in a flush manner". (Abstract.) More specifically, as shown in the drawing figure which is a lengthwise section through the reactor unit, the evaporator layer 1 is adjacent to a catalyst layer 2, and the interface between the two is planar. This feature is confirmed by the specification at Column 3, lines 36-38, which states that the "evaporator body...abuts the reaction zone two-dimensionally". It is also possible that the catalyst layer 2 is formed by a porous metallic matrix, with the evaporator layer 1 and the catalyst layer 2 being formed by a single continuous porous matrix.

As is apparent from the foregoing brief description, the Schuessler et al references does not disclose a device for carrying out a solid-catalyzed reaction in which a common area for evaporating liquid starting materials is "at least partially surrounded by the plurality of chambers", with each such chamber including a catalyst. That is, to the extent that there is an interface between the evaporator layer 1 and the catalyst layer 2, it is planar, and furthermore, the evaporator layer 1 is not at least partially surrounded by a plurality of chambers, each of which includes a catalyst.

Applicants note in this regard that the Office Action at paragraph 8 refers to chambers 6, 7 and 10 as surrounding the evaporation unit. However, the channels 6 and 7 merely serve to supply liquid components to the evaporator layer 1, while the channels 10 collect the reformate gas generated in the catalyst layer 2. The latter channels do not partially surround the evaporate 1, and at least channels 6 and 7 do not in any way "compris[e] a catalyst".

The Isomura et al reference, on the other hand, discloses a process for producing high purity hydrogen, in which methanol 1, water vapor 2 and air 3 are input to a vaporization chamber 10 which is adjacent to a reforming chamber 11. (See Column 4, lines 33-37.) Vaporized methanol, water and air flow from the vaporization chamber 10 into the reforming chamber 11, where they undergo reforming and partial oxidation in the presence of the catalyst 12. The hydrogen

gas generated by these reactions enters the separated gas chamber 14 via a hydrogen permeable membrane 13.

Insofar as this reference discloses, the interface between the vaporization chamber 10 and the reforming chamber 11 is planar, as depicted in Figure 2. Nothing in the specification suggests otherwise. Accordingly, like Schuessler et al, Isomura et al fails to teach or suggest a device for carrying out a solid-catalyzed reaction in which the area of evaporation unit in which evaporation of liquid starting materials substantially takes place is "at least partially surrounded by the plurality of chambers", each of which chambers comprises a catalyst material, as recited in Claim 1.

Finally, the Lamla et al patent discloses a catalytic reactor system which includes a vaporizer unit 1, a reforming reactor 2, and a cooling chamber 3. (See, for example, page 2 of 6, paragraph [0009], first sentence.) As shown in the figures of the drawing, starting materials flow into the evaporator unit 1, from there to the reformer 2, and thereafter back to the cooler 3, which is in thermal contact with the evaporator. (See translation, page 4 of 6 at paragraph [0024].)

Figures 5 and 6 show the details of an embodiment which conforms to the same configuration as Figure 1. That is, as best seen in Figure 6, the reformer unit comprises an outer casing 20 which houses the evaporator 1, reformer 2 and cooler 3. As shown by the arrows in Figure 6, and discussed in the specification

at paragraph [0036], the starting material (represented by an arrow E) flows through the evaporation field 1 to a starting material duct 12 which extends almost perpendicular to the flat surface of the catalyst equipment layers 2a, as also indicated paragraph [0034], lines 7-10. As noted there, the material duct 12 forms the conduit 13 which penetrates perpendicularly to the flat surface of the catalyst equipment layers 2a. As further described in paragraph [0036], the starting material flows through the material duct 13 and is lead to the catalyst layers 2a where it flows outwardly to a space 21 between the catalyst unit 2 and the casing 20. Thereafter, the reformate gas flows upwardly and then radially inwardly through the cooling unit 3 and out through the ducts 11, as also indicated in paragraph [0036]. As can be seen from Figure 5, the ducts 11, which serve only to collect and remove the cooled reformate gas partially surround the evaporation unit 1. As seen in Figure 6, the ducts 11 do not extend downwardly through the cooler unit 3.

The Lamla et al reference, including the embodiment of Figures 5 and 6, does not anticipate Claim 1. That is, Lamla et al does not provide a device for carrying out a solid-catalyzed reaction in which an evaporation unit is at least partially surrounded by a plurality of chambers each of which comprises a catalyst. In particular, the ducts 11 are channels for removal of reformate gas, and, contain no catalyst material at all. The reference numerals 12 and 13, on the other hand, referred to in the Office Action simply designate the lower

portion of the conduit, which is presumably perforated in order to allow gas to flow radially outwardly through the reformer layers 2a, as indicated in Figure 6.

The cooling unit 3 in Figure 6 is, as in Figures 1 and 2, in thermal contact with the evaporation unit 3, and in the embodiment of Figures 5 and 6 surrounds it. However, as can be seen from Figure 6 in particular, the cooling unit does not include a plurality of chambers, each chamber comprising a catalyst, as recited in Claim 1. Accordingly, Applicants respectfully submit that Claim 1 is not anticipated by Lamla.

New Claim 15 defines a device for generating a gaseous fuel comprising a catalyst reactor for generating the gaseous fuel, with the catalytic reactor comprising a plurality of chambers each of which contains a catalyst material that is used in the catalytic reaction. In addition, Claim 15 also recites that the interface between the evaporator unit and the catalytic reactor unit "is three-dimensional, whereby said evaporator is at least partially surrounded by said plurality of chambers" the latter referring, of course, to the plurality of chambers which make up the catalyst reactor for performing the catalytic reaction to generate the gaseous fuel. For the reasons set forth above, Applicants respectfully submit that Claim 15 further distinguishes over the cited references by reason of these additional limitations.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #1748X/50407).

Respectfully submitted,

Richard R. Diefendorf, Reg. No. 32,390

Gary R. Edwards
Registration No. 31,824

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
GRE:kms
Attachment – Replacement Drawing Sheet (Showing Figures 1 and 2)

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